

# ULTRA HIGH-FREQUENCY INDUCTION HEATER

This manual shall be made available to all users of this high-frequency induction heater. To ensure the best results and maximum durability of this U.S. SOLID LLC (here after U.S. SOLID or The Company) product, read and follow all instructions carefully. Failure to do so may lead to serious bodily injury and catastrophic damage to the heater, supplies, or surrounding area. All safety suggestions must be followed closely and precautions must be taken to guarantee this heater is only used by qualified personnel who have understood this guide.

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## Getting started

Thank you for purchasing the U.S. SOLID high-frequency induction heater. To ensure smooth and safe operations, please review this full manual and refer to our website for an explain video on how to operate this premium product:

<https://ussolid.com/high-frequency-heater.html>

Changes in technology happen often and rapidly, which is why our team at U.S. SOLID reserves the right to modify the specifications and procedures for this high-frequency induction heater immediately and without notice. The Company will not assume responsibility for equipment damage or malfunction due to improper operation, incorrect repairs, or use of unauthorized parts.

This induction heater has passed rigorous testing and extensive research and development. Like all of our products, it is made with quality materials at a reasonable price. This induction heater is suitable for heating a variety of metals in different sizes.

You have 30 days from the date of delivery to return this product. If the returned item has been opened, a 15% restocking fee will be applied. We provide a 12-month warranty from the date of the sale. Within the warranty window, we are responsible for any replacement parts needed caused by quality issues. If you want to return a defective item, please contact our customer service team to receive a free prepaid shipping label for your return. To expedite the warranty process, please describe the issue and include the following information: purchase date, order number, name of the original purchasing entity, delivery address, and serial number. After the 12-month warranty period, we offer to replace parts at current retail cost, but complete product returns will not be accepted.

The warranty will only be in effect if all instructions in the manual are followed. The warranty does not cover damage caused by force majeure (e.g., natural disasters such as hurricanes, floods, or earthquakes).

This manual includes basic safety precautions and instructions for installation, operation, and maintenance.



## Safety instructions

1. Please first confirm the model, additional features, and supporting information of the device you have purchased.
2. Please read this manual carefully before installation and store it properly after installation.
3. The design of the induction coil requires maintaining the inductance of the induction coil within an appropriate range. Please use the induction coil prepared by our company. If self-made, please consult our company to avoid improper parameters of the induction coil, which may affect heating efficiency or cause equipment damage.
4. Ensure clean water cooling, with a cooling water temperature not exceeding 40 °C, otherwise it may cause easy damage to the machine.
5. Any connection or installation must be carried out with the device power turned off to prevent electric shock.
6. Equipment maintenance must be carried out by professionally trained personnel to prevent electric shock.
7. This product belongs to our company's own intellectual property and is protected by law. Any unauthorized copying, surveying, or dismantling that causes damage to the equipment will not be repaired by our company, and we reserve the right to pursue any infringement.



## Specifications

Model	USS-JFHFIH00010
Max. Inductive Power	6 KW
Input Voltage	180-245 V, Single Phase
Fluctuating Frequency	500-2200 kHz
Output Current	5-30 A
Load Duration	100%
Min. Cooling Water Pressure	0.2 MPa
Flow Rate of Cooling Water	2-5 L/min
Time Function	
Heating Time	0.1-99.9 seconds
Holding Time	0.1-99.9 seconds

## Front panel of the heater



### **POWER** Indicator Light

Turn on the power switch, this light indicates that there is power.

### **OPERATE** Indicator Light

When heating normally, this light flashes and the buzzer beeps at the same time; About once per second; When the equipment malfunctions, the sound of this light and buzzer is also abnormal, which can be used as a basis for judging the equipment malfunction.

### **WATER LACK** Indicator Light

The equipment is equipped with a water pressure switch inside. When the cooling water pressure is below 0.2Mpa, the equipment will automatically stop working, the



**WATER LACK** indicator light will light up, and a continuous buzzing sound will be emitted; After increasing the water pressure, the alarm will automatically clear and the WATER LACK indicator light will turn off; When there is a shortage of water, the following methods can be used to try to relieve the shortage alarm: first block the water outlet, increase the cooling water pressure, make the pressure switch close, and then restore the water outlet. When the water pressure is too low, this method can maintain operation, but when the water pressure is too low, this method is ineffective, and the cooling water must be improved.

#### **OVER CURRENT** Indicator Light

When this light is on, it indicates that there is an excessive current in the power regulation and frequency conversion control circuits of the device. The device stops working and emits a continuous beep sound. If the alarm is triggered every time it is restarted, it may be a device malfunction.

#### **SHORT CIRCUIT** Indicator Light

When this light is on and alarms, it may be due to damage to the IGBT module in the voltage regulation section or damage to the short circuit sensor. Please consult our company for repair.

#### **INPUT OVER VOLT.** Indicator Light

The device is allowed to input a maximum voltage of 245V. When the input voltage exceeds 245V, the device will automatically stop working, the INPUT OVER VOLT. indicator light will light up, and a continuous beep will sound. When the input voltage is below 245V, the alarm will be automatically released, and the INPUT OVER VOLT. indicator light will go out.

#### **OVER TEMP.** Indicator Light

There is a 55 °C temperature switch installed on the power device heat sink and other main heating devices inside the device. When the temperature of these devices exceeds 55 °C, the device will automatically stop working, the OVER TEMP. indicator light will light up, and a continuous buzzing sound will be emitted to increase water flow and reduce the temperature of the cooling water. When the temperature of these devices is below 55 °C, the alarm will be automatically released and the OVER TEMP. indicator light will automatically turn off.

#### **UNFIT FREQ** Indicator Light

When the oscillation frequency of the device is below 100KHZ or above 500KHZ, this light will be on, and the device will continue to work, but the output power will automatically decay to protect the device from damage. It can be adjusted by the following methods: A. If the frequency is too low, the number of turns of the induction coil can be reduced, or the diameter of the induction coil can be reduced; If the frequency is too high, the number of turns of the induction coil can be increased or the diameter of the induction coil can be increased to reduce the frequency.

#### **KHZ** Indicator Light

For questions or concerns, email: [service@ussolid.com](mailto:service@ussolid.com)



When this light is on, it indicates that the oscillation frequency is currently being displayed, in units of KHZ.

**A Indicator Light**

When this light is on, it indicates that the output oscillation current is currently being displayed, in units of A.

**V Indicator Light**

When this light is on, it indicates that the inverter voltage is currently being displayed, in units of V.

**KW Indicator Light**

When this light is on, it indicates that the output oscillation power is currently being displayed, in units of KW.

**Start Button**

Press this button to start heating the device. When operated with a foot switch, this button does not work.

**Stop Button**

Press this button to stop heating the device.

**KHZ Button**

When the device is working, hold down this button and the digital display will display the oscillation frequency (KHZ) of the device at this time. At this time, the KHZ indicator light will be on.

**A Button**

When the device is working, hold down this button and the digital display will display the output current (A) of the device. At this time, the A indicator light will be on.

**V Button**

When the device is working, hold down this button and the digital display will display the magnitude (V) of the inverter voltage at this time. At this time, the V indicator light will be on.

**KW Button**

When the device is working, hold down this button and the digital display will display the output power (KW) of the device at this time. At this time, the KW indicator light will be on.

**CONSTANT CURRENT OR VOLTAGE Switch**

**CONSTANT POWER Switch**

This panel is a common medium and high frequency panel. When used for medium frequency power supply, it operates in constant voltage/constant power mode; When used in high-frequency power supplies, it operates in constant





current/constant power mode.

- Selection of constant current/constant power for high-frequency power supply: When this switch is selected to CONSTANT CURRENT, the FREQUENCY / CURRENT / VOLTAGE / POWER DISPLAY will generally display the output current value, and the A indicator light will be on. When working, use the panel POWER ADJUST knob to adjust the set current value. The device will try to maintain the actual output current to be the same as the set value and remain stable.

When CONSTANT POWER is selected, the FREQUENCY / CURRENT / VOLTAGE / POWER DISPLAY usually displays the output power value, and the A indicator light is on. When working, use the panel POWER ADJUST knob to adjust the set power value. The device will try to maintain the actual output power to be the same as the set value, and ensure that the A indicator light is on.

It is recommended to use a CONSTANT CURRENT state as a routine, and for continuous heating situations, it is recommended to choose a CONSTANT POWER state.

- Special instructions regarding constant current/constant power

Whether constant current/constant power can be maintained is also influenced by many factors, such as load changes caused by heating materials, matching of sensors, and the size of set values. In many cases, constant current or power cannot be achieved, which is a normal phenomenon.

When the equipment operates in a constant output power control state, regardless of changes in conditions such as cold or hot workpiece, magnetic or non-magnetic, and network voltage fluctuations, the equipment strives to maintain a constant output power. However, if the power knob of the equipment is adjusted to the maximum position, there is no room for automatic adjustment of the constant power, and constant power cannot be achieved.

#### **FREQUENCY / CURRENT / VOLTAGE / POWER DISPLAY Table**

Display frequency/current/voltage/power values. When the KHZ indicator light is on, it displays the oscillation frequency. When the A indicator light is on, it displays the oscillation current, and so on.

**HEAT POWER ADJUST** Switch

**RETAIN POWER ADJUST** Switch

Adjust the output oscillation current or output power to adjust the heating speed.

#### **CONTROL POWER SWITCH**

Power switch for device control circuit.

#### **REMOTE SOCKET**

Connect remote control switches, foot switches, or other position switches to operate the device instead of the Start and Stop buttons on the device panel. When the connected remote control switch is equipped with two non self-locking button switches, ON and OFF, and controlled by two independent normally open contacts, both the remote control switch and the Start and Stop buttons on the panel are effective, and both can be used to control the operation or stop of the equipment; When a foot switch or other non self-locking switch is connected and controlled by a



pair of normally open and normally closed contacts, when the remote control plug is connected, the Start button on the device panel will fail. When the foot switch is stepped on, the device will work, and when the foot switch is released, the device will stop working.

**AUTO Switch**

**MAN Switch**

When the switch is set to MAN, time control does not work, and the heating time is displayed without insulation; When the switch is set to AUTO, the heating and insulation process will automatically proceed according to the preset time.

**PERIOD CONVERT Button**

This button is only effective in AUTO mode. In automatic working mode, this button can be manually activated conversion heating - insulation process, without timing control, commonly used in process testing.

**HEAT POWER ADJUST Switch**

In the AUTO or MAN state, adjust the output current, voltage, or power during heating to adjust the heating speed.

**RETAIN POWER ADJUST Switch**

Only in the AUTO state, adjust the output current, voltage, or power during insulation to adjust the heating speed during insulation.

**TIMEG DISPLAY(SEC.)**

In the MAN mode, display the heating time; In the AUTO mode, display heating and insulation time in sequence.

**HEAT TIME SET**

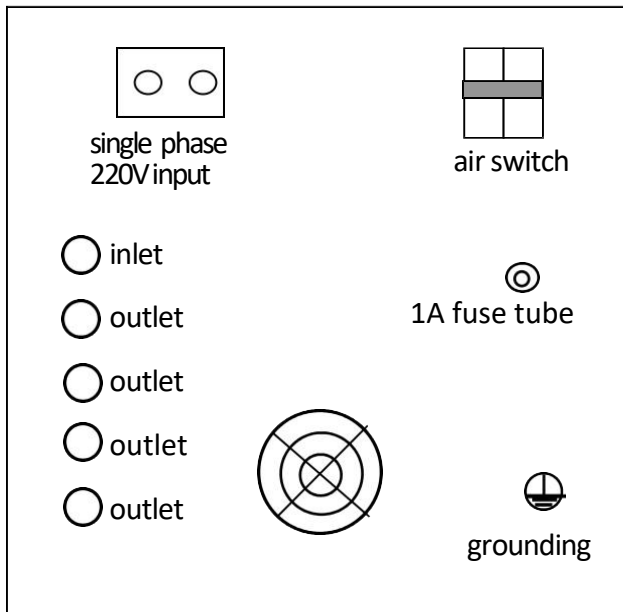
**RETAIN TIME SET**

Set heating time and insulation time.

**REMOTE SOCKET**

A remote control switch, foot switch, or other position switch that replaces the start and stop buttons on the device panel to operate the device. When the connected remote control switch is equipped with two non self-locking button switches, ON and OFF, and controlled by two independent normally open contacts, both the remote control switch and the Start and Stop buttons on the panel are effective, and both can be used to control the operation or stop of the equipment; When a foot switch or other non self-locking switch is connected and controlled by a pair of normally open and normally closed contacts, connect the remote control plug, and the "start" button on the device panel will become invalid. In the MAN state, step on the foot switch device to work, release the foot switch device to stop working; When in AUTO mode, press the foot switch and the equipment will automatically time the heating and insulation process according to the preset time, and then automatically shut down; When the automatic time program is not yet finished, stepping on the foot switch again may cause confusion in the program.

## Back of the heater



**safe tube:** 1A control fuse.

**single phase 220V input:** main power input, select suitable copper wire for installation according to installation requirements, crimp the wire with wire nose, and then lock it with screws.

**air switch:** 60A air switch, which is the main power switch of the equipment.

**inlet and outlet:** Select 8x12. Connect the water pipes to the equipment cooling water according to the requirements, and do not connect the inlet and outlet pipes incorrectly to avoid errors causing equipment damage due to poor cooling.

**grounding:** The power supply must be well grounded to prevent electric shock hazards for workers.

## Operation steps

1. Close the external power switch, close the air switch on the rear panel of the device, and close the control power switch on the front panel of the device.
2. Open the cooling water and observe that there is a certain amount of water flow in the outlet pipe.
3. Refer to the section on "Panel Functions" and adjust the parameters on the high-frequency power supply panel.
4. Place the workpiece to be heated into the induction ring.
5. Press the start button on the control panel or press the foot switch to start heating.
6. Press the stop button on the operation panel or release the foot switch to stop heating.
7. When shutting down, first turn off the power switch on the front panel, turn off the external main power switch, and then turn off the water half an hour later; The air switch on the rear panel of this device is mainly designed for current limiting protection. In order to extend its service life, this air switch should be kept closed at all times. When shutting down, it does not need to be turned off. When installing the device, each device should be equipped with a dedicated power on switch and current limiting fuse externally.

## Precautions

1. Ensure that all installation work has been completed.
2. Please read in detail the section on the functions of ordinary panels and self-control panels in this manual to understand the functions and roles of each operating device on the panel.
3. Please do not use the device when the input voltage range is 180-245V and the grid voltage is higher than 245V.
4. After the device is powered on, it is prohibited to touch the input connectors, output connectors, sensors, etc. on the device to prevent the risk of electric shock.
5. Any changes to the wiring inside and outside the device must be made after turning off the device power.
6. The interior of the equipment and the sensing ring must be cooled with water, and the water source must be kept clean to avoid blocking the cooling pipeline and causing equipment overheating and damage.
7. The working environment of the equipment should ensure no corrosion, no metal dust, dry, clean, and avoid high temperatures.

## Design of induction coils

1. The current passing through the induction coil is high, so the induction coil must be water-cooled. It is recommended to use  $\phi$  Above 3, wall thickness greater than 1mm. Using purple copper tubes and square copper tubes to make induction coils to reduce copper heat loss and improve heating efficiency.

2. The design of the induction coil directly affects the heating effect. It is recommended to use the manufacturer's designed induction coil. If you design it yourself, be sure to consult the manufacturer.

## Select the constant current/constant power control mode

1. Choose constant current control mode: Place the "constant current/constant power" switch in the constant current position. At this time, the equipment operates in a constant current control state, and the heating power and heating speed will vary with the temperature of the workpiece, network voltage fluctuations, and other conditions. For ferromagnetic materials such as steel, the heating speed is fast and the heating power is high in the cold state; When in the hot state above 600 °C, the heating speed is slow and the heating power is small. For non-magnetic materials such as graphite, the opposite situation may occur.

2. Select constant power control mode: Place the "constant current/constant power" switch in the constant power position. In this state, the device will control the output active power (including heating power and loss power, etc.) to remain unchanged. Regardless of the changes in conditions such as cold or hot state of the workpiece, magnetic or non-magnetic, magnetic transformation during the heating process of ferromagnetic materials (such as steel), and fluctuations in grid voltage, the device strives to maintain a constant control output power, that is, to ensure that the heating power remains basically unchanged, thereby achieving faster heating speed, higher heating temperature, etc.

3. Users can compare the heating effects of two different selection states by themselves.

## Select panel operation/foot switch operation

1. When selecting panel operation, please unplug the foot switch (or remote control switch), press the start button once to start the device, and press the stop button once to stop the device.

2. When selecting the foot switch operation, press the foot switch to activate the device; Release the foot switch and the equipment will stop working.